

PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

23 October 2000 (23.10.00)

International application No.

PCT/US00/04401

Applicant's or agent's file reference

VT-2084/PCT

International filing date (day/month/year)

22 February 2000 (22.02.00)

Priority date (day/month/year)

23 March 1999 (23.03.99)

Applicant

BARKER, Jeremy

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

20 September 2000 (20.09.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Nestor Santesso

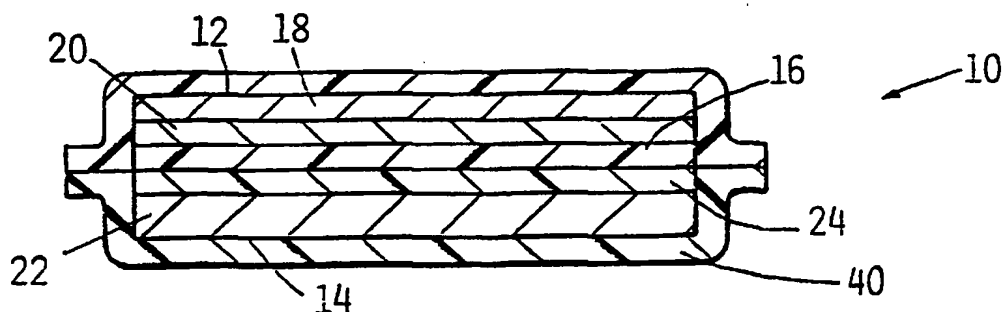
Telephone No.: (41-22) 338.83.38



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H01M 4/58, 4/48, C01B 25/30	A1	(11) International Publication Number: WO 00/57505 (43) International Publication Date: 28 September 2000 (28.09.00)
<p>(21) International Application Number: PCT/US00/04401</p> <p>(22) International Filing Date: 22 February 2000 (22.02.00)</p> <p>(30) Priority Data: 09/274,371 23 March 1999 (23.03.99) US</p> <p>(63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application US 09/274,371 (CON) Filed on 23 March 1999 (23.03.99)</p> <p>(71) Applicant (for all designated States except US): VALENCE TECHNOLOGY, INC. [US/US]; 301 Conestoga Way, Henderson, NV 89015 (US).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): BARKER, Jeremy [GB/US]; 15709 N.E. 98th Way, Redmond, WA 98052 (US).</p> <p>(74) Agents: DESCHERE, Linda, M. et al.; Young & Basile, P.C., 3001 West Big Beaver Road #624, Troy, MI 48084-3107 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>	

(54) Title: LITHIUM-CONTAINING PHOSPHATE ACTIVE MATERIALS



(57) Abstract

The invention provides novel lithium-containing phosphate materials having a high proportion of lithium per formula unit of the material. Upon electrochemical interaction, such material deintercalates lithium ions, and is capable of reversibly cycling lithium ions. The invention provides a rechargeable lithium battery which comprises an electrode formed from the novel lithium-containing phosphates.

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PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference VT-2084/PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 00/ 04401	International filing date (day/month/year) 22/02/2000	(Earliest) Priority Date (day/month/year) 23/03/1999
Applicant VALENCE TECHNOLOGY, INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/04401

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H01M4/58 H01M4/48 C01B25/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 H01M C01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, CHEM ABS Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98 12761 A (SAIDI MOHAMED YAZID ;BARKER JEREMY (US); VALENCE TECHNOLOGY INC (U) 26 March 1998 (1998-03-26) claims 1,3,15-17 ---	1,11,16, 17,20
A	US 5 674 645 A (TARASCON JEAN-MARIE ET AL) 7 October 1997 (1997-10-07) claim 1 -----	1,11,16, 17,20

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
 "E" earlier document but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
 "&" document member of the same patent family

Date of the actual completion of the international search

31 July 2000

Date of mailing of the international search report

07/08/2000

Name and mailing address of the ISA
 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Andrews, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/04401

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9812761	A	26-03-1998	US 5871866 A	16-02-1999
			AU 4410297 A	14-04-1998
			EP 0931361 A	28-07-1999

US 5674645	A	07-10-1997	AU 711516 B	14-10-1999
			CN 1229528 A	22-09-1999
			EP 0947012 A	06-10-1999

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 16 JUL 2001

WIPO PCT

Applicant's or agent's file reference SR 18732 US/PA	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) FOR FURTHER ACTION	
International application No. PCT/US00/04401	International filing date (day/month/year) 22/02/2000	Priority date (day/month/year) 23/03/1999
International Patent Classification (IPC) or national classification and IPC H01M4/58		
Applicant VALENCE TECHNOLOGY, INC.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.


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3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 20/09/2000	Date of completion of this report 16.07.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Battistig, M Telephone No. +31 70 340 3738



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US00/04401

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-36 as originally filed

Claims, No.:

1-22 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US00/04401

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-22
	No: Claims
Inventive step (IS)	Yes: Claims 1-22
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-22
	No: Claims

2. Citations and explanations
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US00/04401

Ad V:

Novelty:

A lithium-ion battery containing a positive electrode active material having the formula $\text{Li}_a\text{M}'_{(2-b)}\text{M}''_b\text{P}_3\text{O}_{12-c}\text{Z}_c$, wherein $0 \leq b \leq 2$, $0 < c < 12$, $a > 0$, M' and M'' are same or different elements selected from the group of metalloids or metals, and Z is a halogen; has not been disclosed in any cited document.

The subject-matter of claims 1 to 10 and 17 to 19 is novel.

An electrochemical cell having an electrode comprising active material represented by the formula disclosed at line 35 of claim 11 has not been disclosed in any document cited.

The subject-matter of claims 11 to 15 is novel.

An electrode having an active material having the formula $\text{Li}_{3-x}\text{E}'_{(2-b)}\text{E}''_b\text{P}_3\text{O}_{12-c}\text{F}_c$, wherein $x=0$ or $0 < x \leq 3$, $0 \leq b \leq 2$, $0 < c < 12$, $a > 0$, M' and M'' are same or different elements selected from the group of metalloids or metals; has not been disclosed in any cited document.

The subject-matter of claim 16 is novel.

An electrode which comprises an active material having the formula $\text{Li}_a\text{M}'_{(2-b)}\text{M}''_b\text{Si}_y\text{P}_{3-y}\text{O}_{12-c}\text{Z}_c$, wherein $0 \leq b \leq 2$, $0 < c < 12$, $a > 0$, $0 \leq y < 3$, M' and M'' are same or different elements selected from the group of metalloids or metals, and Z is a halogen; has not been disclosed in any cited document.

The subject-matter of claims 20 to 22 is novel.

Inventive step:

Document WO9812761, which is considered to represent the closest prior art, discloses the use of electrodes containing phosphates as intercalating active material. It differs from the invention in that the use of halogenated phosphates is not mentioned. The problem is how to provide an active material showing better performance than the one disclosed in WO9812761.

It is not obvious for the skilled person starting from WO9812761 to use halogenated phosphates as active materials in secondary non-aqueous batteries and arrive at the invention because it is neither suggested anywhere in the cited documents nor common knowledge.

The subject-matter of claims 1 to 22 do appear to involve an inventive step.